

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A current-perpendicular-to-plane (CPP)  
2 GMR/tunnel valve (TV) sensor, comprising:
  - 3 a sensor stack having a free layer forming an active area;
  - 4 a spacer layer formed over a top surface of the free layer of the sensor stack;
  - 5 a biasing layer disposed over on and in contact with a top surface of the spacer;  
6 and
    - 7 a high coercivity layer formed without contact with the biasing layer and adjacent  
8 the sensor stack for pinning the biasing layer, the biasing layer maintaining a direction of  
9 magnetization in the free layer until influenced by a readback field.
- 1 2. (Original) The CPP GMR/ TV sensor of claim 1, wherein the high  
2 coercivity layer comprises an alpha-Fe<sub>2</sub>O<sub>3</sub> layer.
- 1 3. (Original) The CPP GMR/ TV sensor of claim 1 further comprising a  
2 seed layer disposed over the high coercivity layer and a coupling layer disposed over the  
3 bias layer and the seed layer.
- 1 4. (Original) The CPP GMR/ TV sensor of claim 3, wherein the seed  
2 layer comprises a NiFe seed layer, the high coercivity layer comprises an alpha-Fe<sub>2</sub>O<sub>3</sub>  
3 layer formed adjacent the sensor stack in a passive area and the coupling layer comprises  
4 NiFe layer.

1           5.       (Original)     The CPP GMR/ TV sensor of claim 1, wherein the sensor  
2   stack comprises a pinned layer, a spacer layer and the free layer.

1           6.       (Original)     The CPP GMR/ TV sensor of claim 5, wherein the pinned  
2   layer comprises a first CoFe layer, a Ru layer and a second CoFe layer.

1           7.       (Currently Amended) The CPP GMR/ TV sensor of claim 5, wherein the  
2   free layer comprises an a CoFe/NiFe alloy layer comprising CoFe and NiFe.

1           8.       (Original)     The CPP GMR/ TV sensor of claim 5, wherein the sensor  
2   stack further comprises a sensor stack seed layer, the pinned layer being formed on the  
3   seed layer.

1           9.       (Original)     The CPP GMR/ TV sensor of claim 8, wherein the sensor  
2   stack seed layer comprises a NiFeCr layer, a NiFe layer and a PtMn layer.

1           10.      (Currently Amended) The CPP GMR/ TV sensor of claim 1, wherein the  
2   bias layer is pinned attains pinning by exchange coupling between the bias layer in the  
3   active area and passive areas and the high coercivity layer.

1           11. (Currently Amended) A magnetic storage system, comprising:  
2           a magnetic storage medium having a plurality of tracks for recording of data; and  
3           a CPP GMR/ TV sensor maintained in a closely spaced position relative to the  
4           magnetic storage medium during relative motion between the magnetic transducer and  
5           the magnetic storage medium, the CPP GMR/ TV sensor further comprising:  
6           a sensor stack having a free layer forming an active area;  
7           a spacer layer formed over a top surface of the free layer of the sensor stack;  
8           a biasing layer disposed ~~over on and in contact with a top surface of~~ the spacer;  
9           and  
10          a high coercivity layer formed without contact with the biasing layer and adjacent  
11          the sensor stack for pinning the biasing layer, the biasing layer maintaining a direction of  
12          magnetization in the free layer until influenced by a readback field.

1           12. (Original)   The CPP GMR/ TV sensor of claim 11, wherein the high  
2           coercivity layer comprises an alpha- $\text{Fe}_2\text{O}_3$  layer.

1           13. (Original)   The CPP GMR/ TV sensor of claim 11 further comprising a  
2           seed layer disposed over the high coercivity layer and a coupling layer disposed over the  
3           bias layer and the seed layer.

1           14. (Original)   The CPP GMR/ TV sensor of claim 13, wherein the seed  
2   layer comprises a NiFe seed layer, the high coercivity layer comprises an alpha- $\text{Fe}_2\text{O}_3$   
3   layer formed adjacent the sensor stack in a passive area and the coupling layer comprises  
4   NiFe layer.

1           15. (Original)   The CPP GMR/ TV sensor of claim 11, wherein the sensor  
2   stack comprises a pinned layer, a spacer layer and the free layer.

1           16. (Original)   The CPP GMR/ TV sensor of claim 15, wherein the pinned  
2   layer comprises a first CoFe layer, a Ru layer and a second CoFe layer.

1           17. (Currently Amended) The CPP GMR/ TV sensor of claim 15, wherein the  
2   free layer comprises an a-CoFe/NiFe alloy layer comprising CoFe and NiFe.

1           18. (Original)   The CPP GMR/ TV sensor of claim 15, wherein the sensor  
2   stack further comprises a sensor stack seed layer, the pinned layer being formed on the  
3   seed layer.

1           19. (Original)   The CPP GMR/ TV sensor of claim 18, wherein the sensor  
2   stack seed layer comprises a NiFeCr layer, a NiFe layer and a PtMn layer.

1           20. (Currently Amended) The CPP GMR/ TV sensor of claim 11, wherein the  
2   bias layer is pinned attains pinning by exchange coupling between the bias layer in the  
3   active area and passive areas and the high coercivity layer.

- 1            21. (Original) A method for reducing the thickness of a sensor stack in a
- 2        current-perpendicular-to-plane (CPP) GMR/tunnel valve (TV) sensor, comprising:
- 3            forming a sensor stack seed layer;
- 4            forming, over the sensor stack seed layer, a sensor stack having a free layer, a
- 5        spacer and a pinned layer;
- 6            forming a spacer layer over the free layer of the sensor stack;
- 7            forming a biasing layer over the spacer; and
- 8        adjacent to the sensor stack, forming a high coercivity layer for pinning the bias
- 9        layer;
- 10          forming a passive area seed layer over the high coercivity layer;
- 11          forming a layer of Ta over the bias layer and the passive area seed layer;
- 12          removing the Ta layer even with the bias layer;
- 13          forming, over the bias layer and the passive area seed layer, a coupling layer for
- 14        pinning the biasing layer, the biasing layer maintaining a direction of magnetization in
- 15        the free layer until influenced by a readback field; and
- 16          forming a cap over the coupling layer.